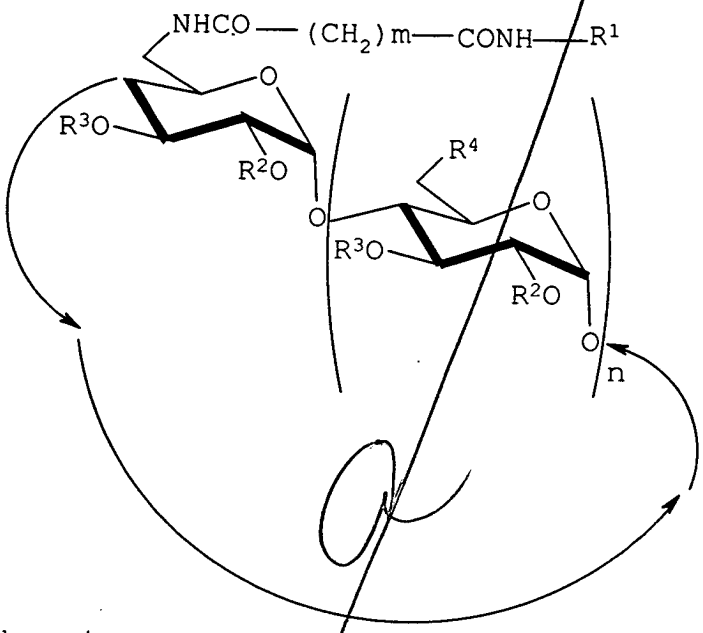
CLAIMS

1. Amphiphilic cyclodextrin derivative complying with the formula:

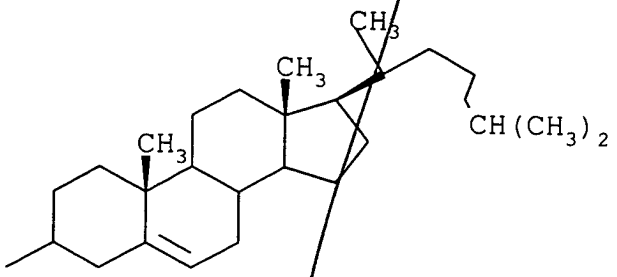


(I)

wherein:

- R^1 represents a group derived from a steroid,
- R^2 represents an alkyl or aryl group, substituted if applicable,
- R^3 represents H or R^2,
- all the R^4 represent OR^2, or
- one of the R^4 represents $-NHCO(CH_2)_mCONHR^1$, and the other R^4 represent OR^2 provided that there is at least one glucose unit where R^4 represents OR^2 between the two glucose units comprising the substituent $—NHCO—(CH_2)_m—CONH—R^1$,
- m is an integer ranging from 1 to 8, and
- n is equal to 5, 6 or 7.

2. Cyclodextrin derivative according to claim 1 wherein R^1 represents the group according to the formula:



(III)

3. Cyclodextrin derivative according to claim 1 or 2, wherein all the R^4 represent OR^2.

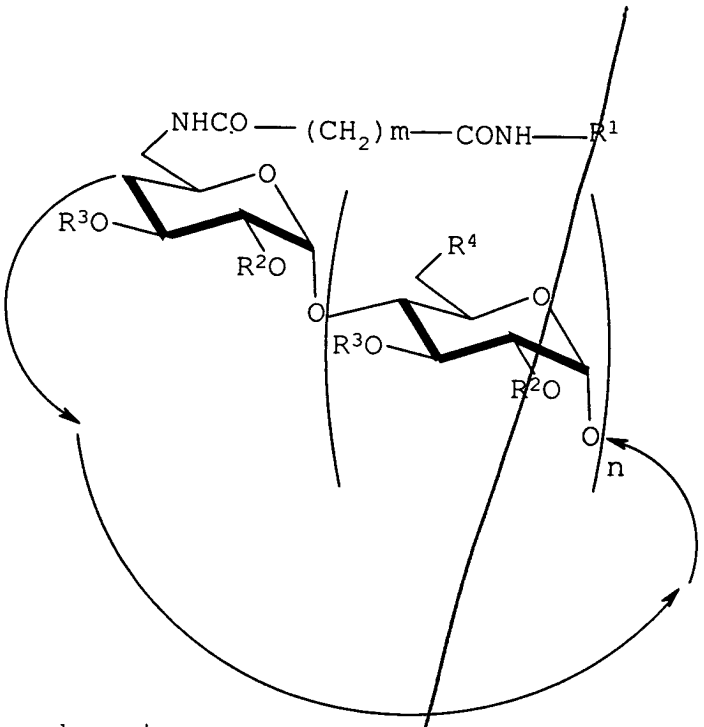
4. Cyclodextrin derivative according to any of claims 1 to 3, wherein R^2 represents the methyl group and R^3 represents a hydrogen atom.

5. Cyclodextrin derivative according to any of claims 1 to 4, wherein n is equal to 6.

6. Cyclodextrin derivative according to any of claims 1 to 5, wherein m is equal to 2.

7. Mono-6-(cholest-5-en-3α-ylamide)succinylamide-6-deoxy-2,2',2'',2''',2'''',2''''',2'''''',6',6'',6''',6'''',6''''',6''''''-trideca-O-methyl-cyclomaltoheptaose.

8. Method to prepare a cyclodextrin derivative according to the formula:



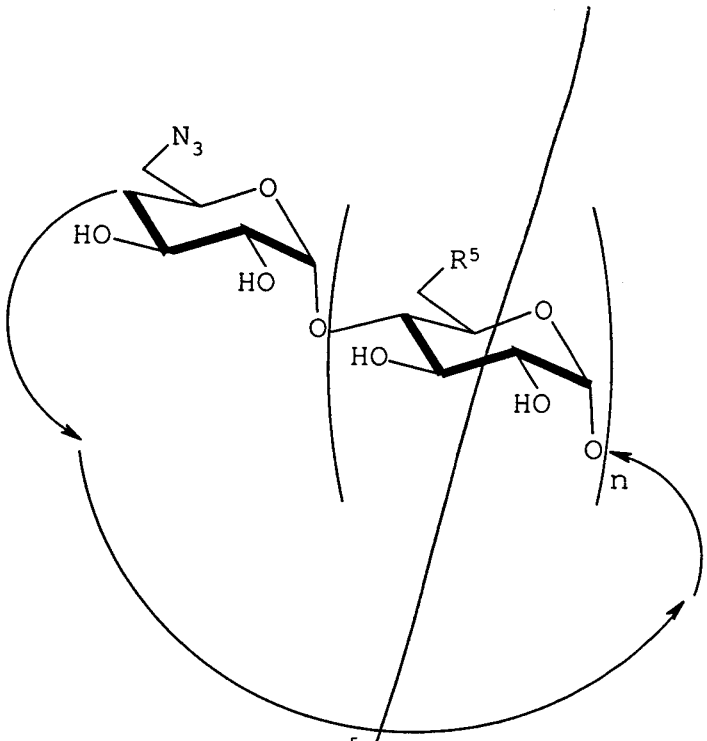
(I)

wherein:

- R^1 represents a group derived from a steroid,
- R^2 represents an alkyl or aryl group, substituted if applicable,
- R^3 represents H,
- all the R^4 represent OR^2, or
- one of the R^4 represents $-NHCO(CH_2)_mCONHR^1$, and the other R^4 represent OR^2 provided that there is at least one glucose unit where R^4 represents OR^2 between the two glucose units comprising the substituent $—NHCO—(CH_2)_m—CONH—R^1$,
- m is an integer ranging from 1 to 8, and
- n is equal to 5, 6 or 7,

which comprises the following steps:

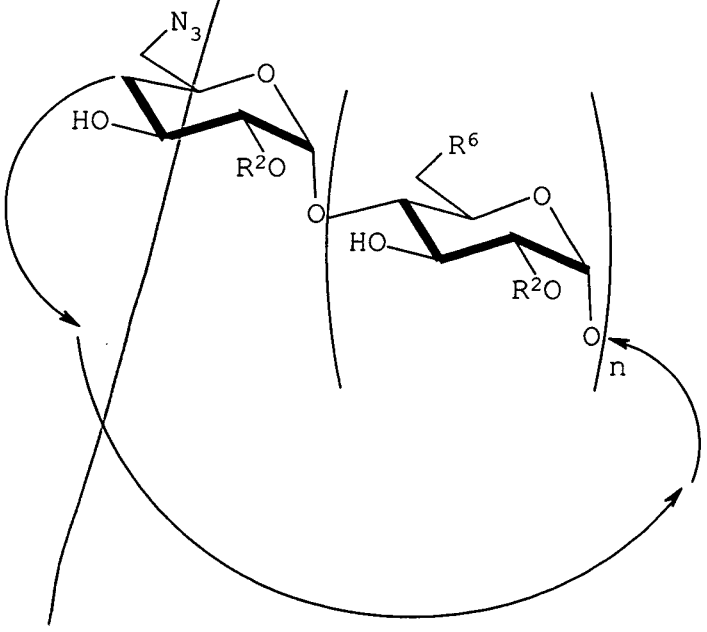
a) react a derivative according to the formula:



(IV)

wherein all the R^5 represent OH, or one of the R^5 represents —N_3 and the other R^5 represent OH, provided that there is at least one glucose unit where R^5 represents OH between the two glucose units comprising the N_3 substituent, and n is equal to 5, 6 or 7,

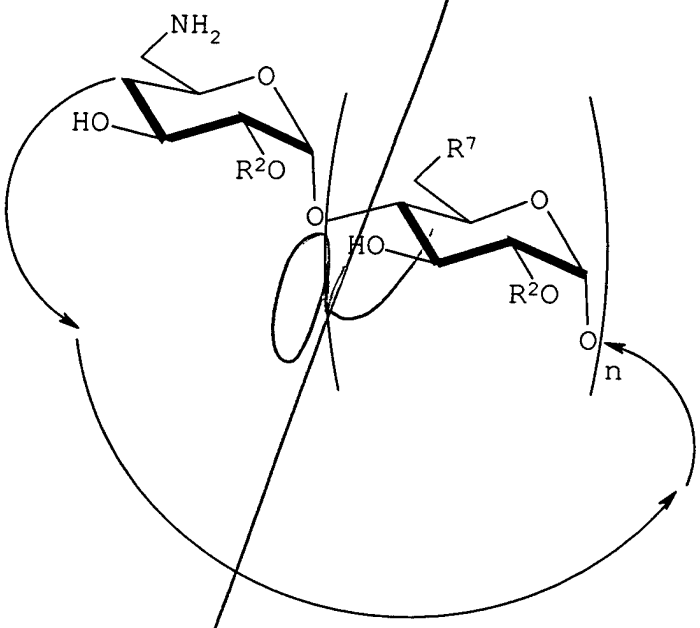
with a dialkyl sulphate $SO_4R^2_2$ where R^2 has the significance given above, in a basic medium to obtain the cyclodextrin derivative according to the formula:



(V)

wherein all the R^6 represent OR^2, or one of the R^6 represents N_3 and the other R^6 represent OR^2, and R^2 and n are as defined above,

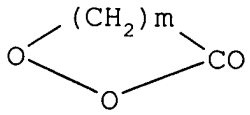
b) perform a Staudinger reaction on the derivative according to formula (V) using triphenylphosphine and ammonia to convert N_3 into NH_2 and obtain the derivative according to the formula:



(VI)

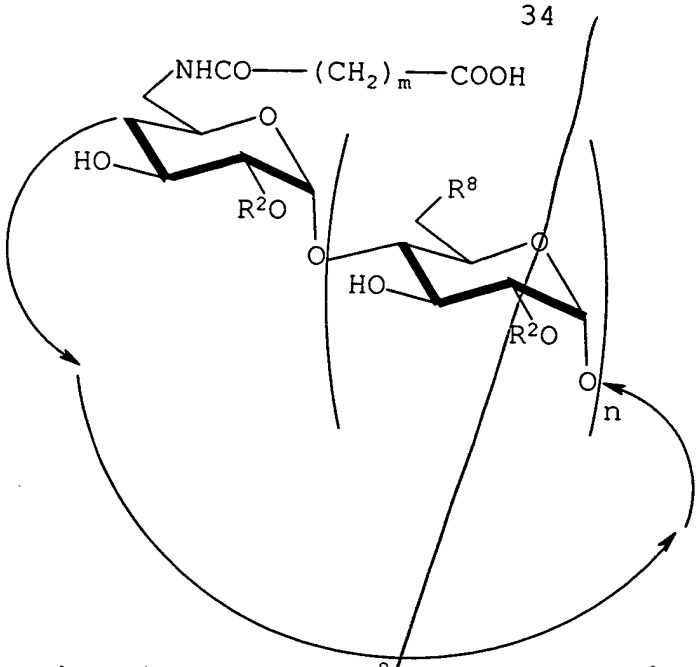
wherein all the R^7 represent OR^2, or one of the R^7 represents NH_2 and the other R^7 represent OR^2, and R^2 and n are as defined above,

c) react the derivative according to formula (VI) with an acid anhydride according to the formula:



(VII)

where m is as defined above, to obtain the derivative according to the formula:

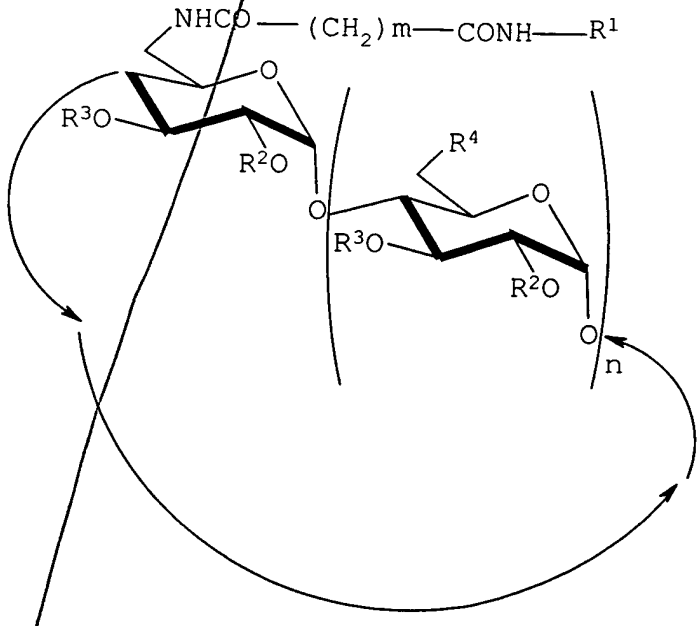


(VIII)

wherein all the R^8 represent OR^2, or one of the R^8 represents —NHCO—$(CH_2)_m$—COOH and the other R^8 represent OR^2, and R^2, m and n are as defined above, and

d) react the derivative according to formula (VIII) with a compound according to the formula NH_2-R^1 to obtain the cyclodextrin derivative according to formula (I) defined above.

9. Method to prepare a cyclodextrin derivative according to the formula:



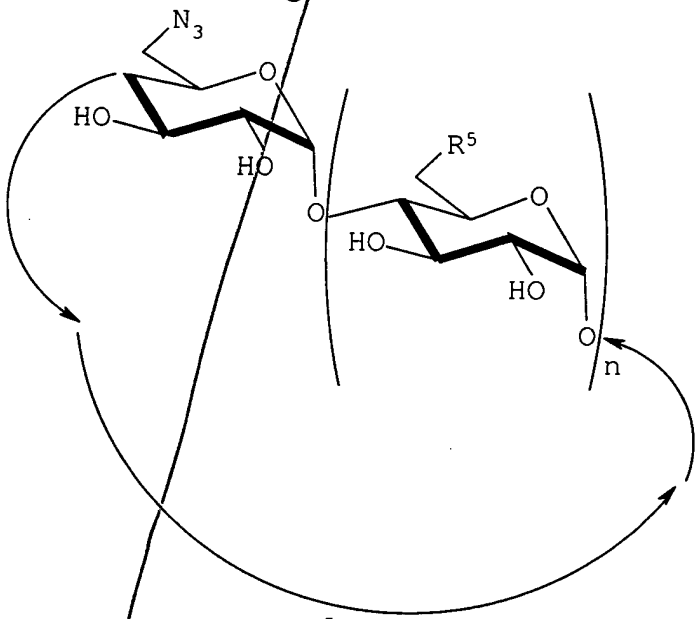
(I)

wherein:

- R^1 represents a group derived from a steroid,
- R^2 represents an alkyl or aryl group, substituted if applicable,
- R^3 represents R^2,
- all the R^4 represent OR^2, or
- one of the R^4 represents $-NHCO(CH_2)_mCONHR^1$, and the other R^4 represent OR^2 provided that there is at least one glucose unit where R^4 represents OR^2 between the two glucose units comprising the substituent $—NHCO—(CH_2)_m—CONH—R^1$,
- m is an integer ranging from 1 to 8, and
- n is equal to 5, 6 or 7,

which comprises the following steps:

a) react a derivative according to the formula:

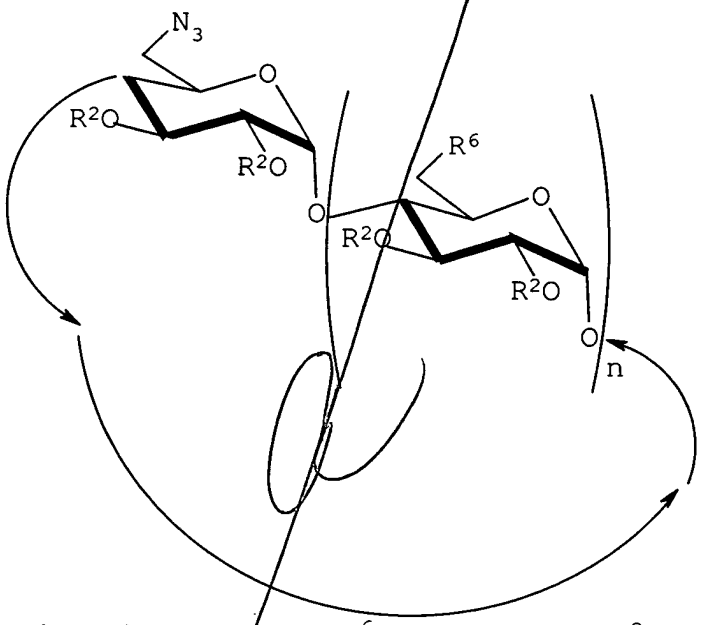


(IV)

wherein all the R^5 represent OH, or one of the R^5 represents $—N_3$ and the other R^5 represent OH, provided that there is at least one glucose unit where R^5

represents OH between the two glucose units comprising the N_3 substituent, and n is equal to 5, 6 or 7,

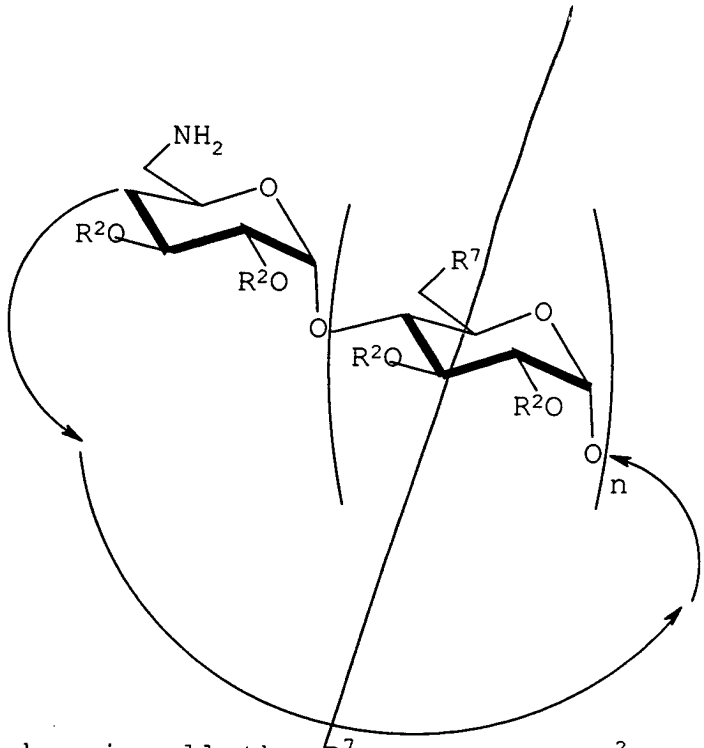
with an iodoalkane according to the formula IR^2 wherein R^2 has the significance given above, in the presence of NaH to obtain the cyclodextrin derivative according to the formula:



(IX)

wherein all the R^6 represent OR^2, or one of the R^6 represents N_3 and the other R^6 represent OR^2, and R^2 and n are as defined above,

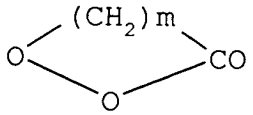
b) perform a Staudinger reaction on the derivative according to formula (IX) using triphenylphosphine and ammonia to convert N_3 into NH_2 and obtain the derivative according to the formula:



(X)

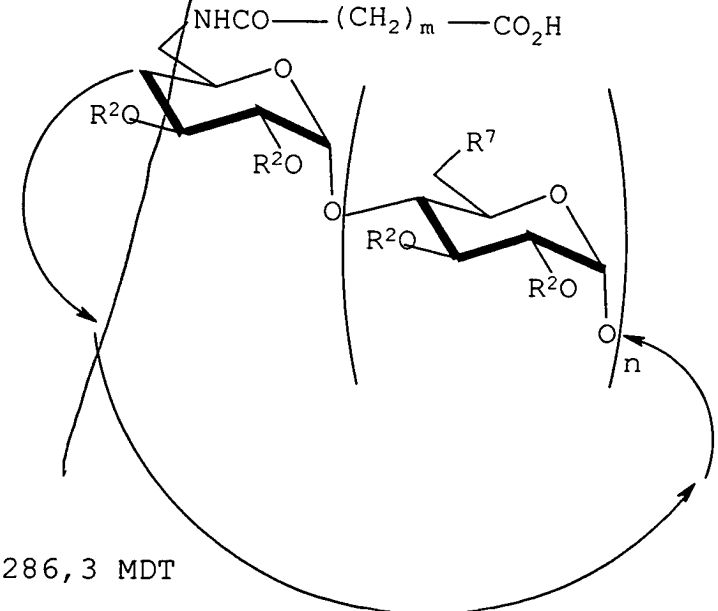
wherein all the R^7 represent OR^2, or one of the R^7 represents NH_2 and the other R^7 represent OR^2, and R^2 and n are as defined above,

c) react the derivative according to formula (X) with an acid anhydride according to the formula:



(VII)

where m is as defined above, to obtain the derivative according to the formula:



(XI)

wherein all the R^7 represent OR^2, or one of the R^7 represents —NHCO—$(CH_2)_m$—COOH and the other R^7 represent OR^2, and R^2, m and n are as defined above, and

d) react the derivative according to formula (XI) with a compound according to the formula NH_2-R^1 to obtain the cyclodextrin derivative according to formula (I) defined above.

10. Inclusion complex of a cyclodextrin derivative according to any of claims 1 to 7, and a hydrophobic compound.

11. Complex according to claim 10, wherein the hydrophobic compound is chosen from steroids, neurotropes, bacteriostatics, vitamins, vascular wall tonics and contrast agents.

12. Complex according to claim 10, wherein the hydrophobic compound is chosen from 16-iodo-3-methylhexadecanoic acid, dothiepin, chloramphenicol, vitamin A and esculin.

13. Aqueous solution of nanoparticles of a cyclodextrin derivative according to any of claims 1 to 7 or an inclusion complex according to any of claims 10 to 12.

14. Organised surfactant system comprising a cyclodextrin derivative according to any of claims 1 to 7 or an inclusion complex according to any of claims 10 to 12.

15. System according to claim 14 wherein the surfactant is a phospholipid.

16. Aqueous solution comprising in solution a combined system formed from phospholipid or membrane protein vesicles, and at least one cyclodextrin derivative according to any of claims 1 to 7 or at least one cyclodextrin derivative inclusion complex according to any of claims 10 to 12.

add a1